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The Dynamics of Male Self-employment in Canada: Comparing the 1990s to the 2000s

by Danny Leung and Chris Robinson

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.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to *0* (zero)
0^s	value rounded to *0* (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Abstract

This paper asks how and why the transition rates for males between non-employment, paid employment, own-account self-employment, and self-employment with paid help changed in Canada between the 1990s and the 2000s. It is found that the self-employed were much less likely to move back into paid employment in the 2000s than they were in the 1990s. Estimates from a dynamic mixed multinomial logit model suggest that increased state dependence, not demographic change or changes in the industrial and occupational structure, accounts for the increased stability. Since the productivity of entrants has been found in the literature to be less than that of incumbents, the fact that there were more newly self-employed in the 1990s and that their businesses did not survive long is likely related to the poorer productivity performance of the self-employment sector in the 1990s compared to that of the self-employment sector in the 2000s.

Executive summary

This paper asks whether the nature of self-employment changed between the 1990s and the 2000s. This question is important not only because of the large numbers of Canadians who are engaged in self-employment today and who have been engaged in self-employment in the past, but also because it contributes to the understanding of why the productivity performance of the unincorporated self-employment sector was poor in the 1990s relative to the 2000s.

This paper examines how the nature of self-employment may have changed, by comparing the labour market transition rates for males (between non-employment, paid employment, own-account self-employment, and self-employment with paid help) in two panels of the Survey of Labour and Income Dynamics (SLID): the 1993–1998 panel and the 2002–2007 panel. An econometric model is then estimated for the purpose of characterizing the change further.

How did the labour market flows in and out of self-employment change between the 1990s and the 2000s?

Compared to the self-employed in the 1990s, the self-employed in the 2000s were much less likely to move to paid employment.

The change in the transition rates is consistent with the argument that many individuals were using self-employment as a stopgap in the 1990s. Instead of persisting in self-employment, the self-employed in the 1990s were more likely to move back into paid employment when opportunities presented themselves. Moreover, fewer paid-employed moved to self-employment in the 2000s than in the 1990s.

What is behind the increased persistence in self-employment?

An econometric model is estimated in order to investigate the increased persistence in self-employment. The model attributes the increased persistence to greater state dependence. Changes in demographics or in the industrial and occupational structure contributed little to the increased persistence. State dependence can be the result of a number of factors. High job search costs may prevent individuals from looking for jobs and moving into paid employment from other employment states, such as self-employment. Sunk costs associated with starting a business (e.g., the purchase of specialized equipment) may impede movement back into paid employment. The building of skills through learning-by-doing can lead to greater state dependence, if skills learned in self-employment cannot be easily transferred to paid employment. Additional research is needed in order to understand better the cause of the increased state dependence between the 1990s and the 2000s.

What are the implications for productivity?

The more transitory nature of self-employment in the 1990s indicates that the businesses started by the newly self-employed at that time did not last long. Previous literature suggests that, on average, entrants are not as productive as incumbents and that it takes time for the productivity of entrants to improve. The fact that there were more newly self-employed in the 1990s and that their businesses did not survive long is likely related to the poorer productivity performance of the self-employment sector in the 1990s compared to that of the self-employment sector in the 2000s.

1 Introduction

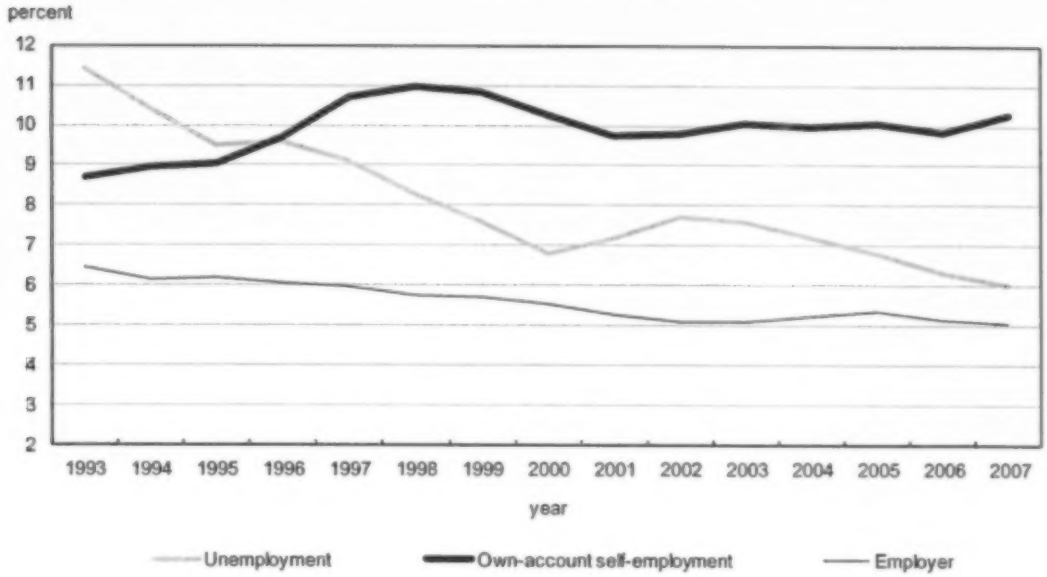
The self-employment rate has often been used as a proxy for the level of entrepreneurship (Audretsch and Thurik 2001). However, not every self-employed individual has a well-established business. Some self-employed may not ever intend to incorporate or to start hiring employees. This fraction of the self-employed are only tentatively connected to the sector, and may be accumulating skills that are applicable more to wage-employment than to expanding a business. Other things equal, these "less entrepreneurial" self-employed would be on average more likely to become wage-and-salary workers than entrepreneurs in the future.

Using two panels of the Survey of Labour and Income Dynamics (SLID), 1993−1998 and 2002−2007, this paper examines whether the nature of self-employment has changed between the 1990s and the 2000s. It computes annual transition rates between non-employment, two types of self-employment, and paid employment, and asks what changes have taken place. The paper then estimates a mixed multinomial logit model with state dependence to ascertain why the transition probabilities have changed. An advantage of using this framework is that one of the interpretations of the degree of state dependence is sector-specific learning. Thus, it is possible to see whether the skills learned in less entrepreneurial types of self-employment have become more or less applicable to paid employment.

Understanding how the nature of self-employment in Canada has changed is important because the productivity performance of the self-employment sector has changed dramatically between the two decades. Baldwin and Rispoli (2010) showed that nominal labour productivity (nominal gross domestic product (GDP) per hours worked) for the unincorporated self-employed remained relatively constant over the 1993−1998 period, while nominal labour productivity increased in the rest of the business sector. Post 2000, the situation was reversed: labour productivity rose faster in the unincorporated sector than in the rest of the business sector. Comparing the labour markets in the 1990s and the 2000s can give some insight into why this turnabout occurred.

Chart 1 shows that the effects of the 1991 recession on the labour market lingered well into the mid-1990s. The unemployment rate was at 11.4% in 1993, and had declined to only 8.3% by 1998. In comparison, the average unemployment rate for the years 2002 to 2007 was 6.9%. The soft labour market conditions of the 1990s were accompanied by a sharp rise in self-employment, particularly in own-account self-employment, that is, self-employment where one does not hire any employees. The rate of self-employment with employees actually fell in the 1990s. Roy and Gauthier (1998) argued that much of the increase in the self-employment rate in the 1990s was due to cost-cutting by firms in the face of persistent weakness in overall demand, and that they expected the rate of self-employment to decrease as economic conditions improved. Thus, it may have been the case that workers were using self-employment as a stopgap in the 1990s. That is to say, self-employment was being used as an alternative to unemployment, and workers would easily switch to paid employment when the opportunity presented itself. Since workers did not intend to stay in self-employment, they may have put less emphasis on picking up skills that would make their businesses more profitable and productive and instead devoted more time to job search.

Chart 1
Unemployment, own-account self-employment and employer rates



Source: CANSIM table 282-0012.

This is not the first paper to study self-employment dynamics in Canada. Kuhn and Schuetze (2001) compared the transitions between non-employment, paid employment, and unincorporated self-employment in the 1980s and the 1990s in order to examine what changes in the transition rates explained the increase in the self-employment rate in the 1990s. For men, they found that the increase in self-employment was due to decreased stability in paid employment. For women, they found that the increase in unincorporated self-employment was due to an increase in the retention rate in self-employment. The standard multinomial logit model that they used to explain the changes in the transitions themselves revealed that changes in demographics could not account for any of the changes in the transition rates. More recently, Esmaeilzadeh (2008) used the SLID to examine the labour dynamics (transitions between being out of the labour force, unemployment, paid employment, and self-employment) for males over the 1993–2004 period. That paper used an econometric framework similar to the one adopted here, but it focused on differences in the transition probabilities between Canadian-born and immigrants and did not look at differences between the 1990s and 2000s.

It is found that there is less movement between paid employment, own-account self-employment, and self-employment with paid help in the 2000s compared to the 1990s. This confirms that self-employment was more transitory in the 1990s. Moreover, estimates from the dynamic mixed multinomial logit suggest that increased state dependence, not cyclical factors (proxied by provincial unemployment rates), demographic change, or changes in the industrial and occupational structure, accounts for increased stability. State dependence can be due to a number of factors. High job search costs may prevent individuals from looking for jobs and moving into paid employment from other employment states, such as self-employment. Sunk costs associated with starting a business (e.g., the purchase of specialized equipment) may impede movement back into paid employment. The building of skills through learning-by-doing can lead to greater state dependence, if skills learned in self-employment cannot be easily transferred to paid employment. One possible explanation for the increased state dependence could be that many newly self-employed in the 1990s were concentrating on moving back into paid employment and consequently focused on accumulating skills for paid employment rather

than on running a business even while they were self-employed. Additional research needs to be done in order to understand the reasons for the increased state dependence.

The more transitory nature of self-employment in the 1990s is likely related to the poorer productivity performance of the self-employment sector in the 1990s compared to the 2000s. Previous literature (e.g., Foster, Haltiwanger, and Krizan 2001, and Baldwin and Gu 2006) suggests that, on average, entrants are not as productive as incumbents and that it takes time for the productivity of entrants to improve. The fact that there were more newly self-employed in the 1990s and that their businesses did not survive as long as the businesses of the newly self-employed in the 2000s would have a negative impact of productivity in the self-employment sector.

The next section, Section 2, presents the conceptual and econometric framework used in this paper. This is followed by a description of the SLID and a presentation of the raw transition probabilities in Section 3. Section 4 presents the estimates of the model and an evaluation of why the transition probabilities changed. Concluding remarks are offered in Section 5.

2 A model of labour market transitions

2.1 Conceptual framework

Each year, individuals choose between non-employment, paid employment, a less entrepreneurial form of self-employment, and an entrepreneurial type of self-employment.[1] In this paper, the presence of employees is used as an indicator of the latter type of self-employment. The hiring of employees is a milestone in the development of a business. It indicates that the business is expected to generate enough income to support not only the business owner but also at least one other person. The hiring of employees also indicates a certain level of commitment to a business. A person might report that he or she is self-employed, but that person's business may not be active. The presence of paid help generally indicates that there is some economic activity; the business owner is putting in at least enough effort to compensate his or her workers.

Other measures can also be used to distinguish the two forms of self-employment. Incorporation is costly and therefore also shows some level of commitment to a business. However, unlike the hiring of employees, incorporation is a one-time cost. It represents genuine interest or expectation of growth in the year of incorporation, but not necessarily in subsequent years. Furthermore, tax policy can influence the margin at which individuals choose to incorporate. Changes in the tax advantages of having a corporate business rather than an unincorporated business may affect the form of organization even when the business owner's expectations or level of effort have not changed. Another way to identify an entrepreneurial business is to look at the income of the business owner. If the amount of income is over a given threshold (the level of income the owner would expect to get if he or she were wage-employed, for example), this indicates a higher degree of commitment and effort on the part of the business owner. The main drawback of this measure is that it is an *ex post facto* indicator. Business incomes are volatile. Even when the level of effort and expectations are high, this does not necessary translate into higher incomes. As well, the period returns to the business owner are difficult to capture. They may come in the form of wages, unincorporated self-employment income, dividends, or expected future capital gains (expected at the time the business is sold). For the above reasons, the presence of paid help is used as a rough identifier of entrepreneurial businesses in this paper.

1. Human Resources Development Canada (2000) also recognizes that the self-employed can be divided into two groups of individuals: individuals whose aim is to earn a "decent" wage, not necessarily to grow their businesses; and individuals who want to expand their businesses. This report also identifies the own-account self-employed with the former group and employers with the latter group.

Individuals are assumed to choose between the four employment states according to which state gives them higher utility. This utility captures both the monetary returns and the various non-pecuniary benefits, such as the flexibility associated with self-employment, the social interaction associated with work, and the returns to home production, associated with employment. Let the utility or attractiveness of being in employment state j for individual i at time t be U^*_{ijt}, where j = non-employment (*NE*), paid employment (*PE*), own-account self-employment (*OASE*), and self-employment with paid help (*ESE*). Individual i chooses occupation j if $U^*_{ijt} > U^*_{ikt}$ for all $k \neq j$.

$$U^*_{ijt} = X'_{it}\beta^*_j + C_{it}\alpha_j + Y^{PE}_{i,j,t-1}\gamma^{PE*}_j + Y^{OASE}_{i,j,t-1}\gamma^{OASE*}_j + Y^{ESE}_{i,j,t-1}\gamma^{ESE*}_j + \eta^*_{ij} + \varepsilon^*_{ijt}, \quad (1)$$

where: X_{it} is a k *X 1* vector of observable individual characteristics; C_{it} is a cyclical indicator that varies over time and the province in which the individual resides; η^*_{ij} denotes unobservable time-invariant individual characteristics that may capture a preference for one sector over another or an innate ability; ε^*_{ijt} denotes the unobservable individual characteristics that vary over time; $Y^{PE}_{i,j,t-1}$ is an indicator variable that is *1* (one) if individual i was in paid employment at time *t-1* and is *0* (zero) otherwise; $Y^{OASE}_{i,j,t-1}$ is an indicator variable that is *1* (one) if individual i was own-account self-employed at time *t-1* and is *0* (zero) otherwise; $Y^{ESE}_{i,j,t-1}$ is an indicator variable that is *1* (one) if individual i was self-employed with paid help at time *t-1* and is *0* (zero) otherwise.

The vector of observable individual characteristics includes controls for the following: education; age; marital status; other family income; the presence of young children; immigrant status; and industry and occupation. Education and age (a proxy for experience) are directly related to an individual's productivity and hence to the monetary returns to each employment state. As shown in Rees and Shah (1986), the effect of education and age on the choice between paid employment and self-employment works through non-pecuniary channels as well. They argue that the more educated are better informed and thus better able to assess business opportunities. This ability to better assess business opportunities lowers the riskiness of self-employment and increases the probability of self-employment if individuals are risk-averse. They also argue that there may be age-related shifts in a person's preference over employment states. For example, older individuals may be more risk-averse and less likely to choose self-employment. Marital status and the education and income of other family members have been used by others, such as Borjas and Bronars (1989) and Hamilton (2000), to capture the degree of family support one has. The idea here is that more family support may make self-employment less risky or less demanding. Likewise, more family support could come in the form of having more children, but the presence of young children may shift an individual's preference toward non-employment or to a form of self-employment that allows for a more flexible work schedule.[2] With respect to being an immigrant, it has been argued that enclave effects and discrimination in paid employment predispose immigrants toward self-employment.[3] Moreover, the existence of a Business Immigration Program in Canada, which seeks to attract investors, entrepreneurs, and the self-employed, may make immigrants more likely to choose some type of self-employment over paid employment. Finally, industry and occupation dummies are included in the choice model for the purpose of capturing the differences in self-employment opportunities that may exist across sectors and occupations.

The cyclical indicator captures the impact of economic conditions on the returns to the employment state. For example, higher business bankruptcy rates in poorer economic times would lower the expected returns of starting a business.

2. See Leung (2006), for example.
3. See Schuetze (2005) for a review of the literature in this area.

The indicator variables that show the individual's employment state in the previous period capture the amount of state dependence in the labour market. There are a number of possible interpretations for this state dependence. High job-search costs may lead to state dependence in non-employment (see, for example, Hyslop 1999). The high costs of market research and other information costs may prevent the non-employed and the paid-employed from setting up businesses. Sunk costs associated with capital equipment and buildings and the duration of a lease may dissuade employers or own-account self-employed from becoming paid-employed. Alternatively, state dependence can be the result of the building of human capital through learning-by-doing (see for example, Eckstein and Wolpin 1989). For example, if an individual spent the previous year in paid employment, he or she undoubtedly would have picked up skills that would increase his or her wage in his current job and/or raise his or her employment prospects. This increased skill or knowledge may not be picked up in the usual set of observed worker attributes. Moreover, these skills may not be state-specific. Skills learned from managing part of a business in a large corporation may be applicable to running one's own business. Skills accumulated in running a business with no employees would be transferable to running a business with employees, but could also find application in paid employment.

2.2 Econometric framework

Utilities are generally not observed, and the fact that an individual is observed in paid employment reveals only that his or her utility from paid employment is greater than that from the other employment states. Therefore, the parameters in (1) are not identified, and some normalization is needed. In this paper, non-employment is chosen as the base category;[4] the effect of the observed covariates on non-employment and the individual time-invariant effect for non-employment are subtracted from the utility from paid employment, own-account self-employment, and self-employment with paid help. For *j = PE, OASE, and ESE*, the transformed utilities are:

$$U_{ijt} = X'_{it}\beta_j + C_{it}\alpha_j + Y^{PE}_{i,j,t-1}\gamma^{PE}_j + Y^{OASE}_{i,j,t-1}\gamma^{OASE}_j + Y^{ESE}_{i,j,t-1}\gamma^{ESE}_j + \eta_{ij} + \varepsilon_{ijt}. \quad (2)$$

Whereas, for *NE*, the transformed utility is:

$$U_{i,NE,t} = \varepsilon_{i,NE,t}.$$

This formulation changes the interpretation of the parameters. For example, β_{PE} would be the marginal effect of X_{it} on the utility of paid employment less the marginal effect of X_{it} on the utility of non-employment (i.e., $\beta_{PE} = \beta^*_{PE} - \beta^*_{NE}$).

To proceed from here, it is necessary to make a distributional assumption about the random shock, and to decide how to estimate the time-invariant individual effect. In this paper, it is assumed that ε_{ijt} follows a type *I* extreme value distribution for all *i*, *j*, and *t*, that ε_{ijt} is uncorrelated across individuals, employment states, and time, and that ε_{ijt} is uncorrelated to the explanatory variables and to η_{ij}. Furthermore, it is assumed that:

4. Kuhn and Schuetze (2001) also used non-employment as the base category. Choosing non-employment as the base category makes the estimated coefficients easier to interpret because key variables such as employment in the previous period, education, and age all increase the returns to paid employment and self-employment relative to non-employment. That is to say, examining the difference in coefficients across time and employment states is easier when all coefficients have the same sign.

$$\begin{pmatrix} \eta_{iPE} \\ \eta_{iOASE} \\ \eta_{iESE} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \Sigma\right)$$

Together these assumptions result in an example of a mixed multinomial logit (MML) model, or random parameters logit model. Unlike the regular multinomial logit model used by Kuhn and Schuetze (2001), the MML model allows for correlation in the error components across alternatives. Allowance for this correlation is important because it relaxes the assumption of independence of irrelevant alternatives made by the multinomial logit. With independence of irrelevant alternatives, the probability associated with choosing between paid employment and non-employment is not affected by the introduction or removal of self-employment as an option. The MML model is a thus a more flexible framework.

Other assumptions could have been made to make the model operable. The time-varying unobservable individual characteristics (the random shock term) could be assumed to follow a multivariate normal distribution, which would lead to a multinomial probit. The advantage of assuming a multivariate normal distribution is that the errors terms could be freely correlated across individuals and employment states. In contrast, the MML model allows for only correlations in the error terms, through the correlation between the individual specific components. While the multivariate normal assumption is appealing theoretically, in practice, it is very time-consuming to estimate the multinomial probit model without any restrictions on the covariance matrix. A drawback that is of greater concern to the application in this paper is that identification is fragile—parameter estimates are unstable, and standard errors are large—when no alternative specific covariates are available. Keane (1992) showed this in the context of a single period multinomial probit, and Rendtel and Kaltenborn (2004) extended Keane's findings to the case of multiperiod multinomial probits. On the other hand, Prowse (2006) demonstrated that the MML model can yield well-behaved and reliable parameter estimates without alternative specific explanatory variables.[5]

Consequently, while the multinomial probit is a more flexible model, identification is more difficult, especially without alternative specific explanatory variables.[6]

Additionally, the individual time-invariant effect could be treated as a fixed effect, not as a random effect, as in Honoré and Kyriazidou (2000), or the random effect could be allowed to vary over time in a particular way, as in Prowse (2007).[7] These approaches are not taken here mainly because of the short-time-series aspect (six years) of the data.

---

5. Prowse (2007) also showed the conditions where identification in a dynamic MML model does not depend solely on the functional form of the unobserved terms.
6. A possible alternative specific explanatory variable that is available in the data is earnings. In occupations in which the individual is not observed, this individual's earnings could be predicted by earnings regressions. Following papers such as those by Rees and Shah (1986) and Leung (2006), a reduced-form occupational choice model would be first estimated, and sample selection correction variables would then be created and used in the self-employment and wage-employment earnings regressions. Predicted earnings from these regressions could be used in the "structural" occupational choice model. This possibility is not pursued here because self-employment earnings are difficult to explain with conventional explanatory variables. The R^2 from self-employment earnings regressions are much lower than those from wage-employment earnings regressions. For example, see Hamilton (2000). The possible unreliability of reported self-employment earnings is one of the reasons why this paper looks at the labour market dynamics, not at earnings, to characterize the self-employed.
7. Esmaeilzadeh (2008) allows each state-specific random effect to follow a discrete multinomial distribution. Since the random effects are not allowed to be correlated, the approach in that paper is not necessarily less restrictive than the one taken in this paper.

Conditional on η_{ij}, the logit assumption means that the probability of individual *i* to be in state *j* (for *j = PE, OASE, and ESE*) in period *t* is:

$$P(Y_{ijt}=1)=\frac{\exp(X'_{it}\beta_j+C_{it}\alpha_j+Y^{PE}_{i,j,t-1}\gamma^{PE}_j+Y^{OASE}_{i,j,t-1}\gamma^{OASE}_j+Y^{ESE}_{i,j,t-1}\gamma^{ESE}_j+\eta_{ij})}{1+\sum_{k=PE,OASE,ESE}\exp(X'_{it}\beta_k+C_{it}\alpha_k+Y^{PE}_{i,k,t-1}\gamma^{PE}_k+Y^{OASE}_{i,k,t-1}\gamma^{OASE}_k+Y^{ESE}_{i,k,t-1}\gamma^{ESE}_k+\eta_{ik})}. \quad (3)$$

Whereas the probability of individual *i* to be in non-employment in period *t is*:

$$P(Y_{i,NE,t}=1)=\frac{1}{1+\sum_{k=PE,OASE,ESE}\exp(X'_{it}\beta_k+C_{it}\alpha_k+Y^{PE}_{i,k,t-1}\gamma^{PE}_k+Y^{OASE}_{i,k,t-1}\gamma^{OASE}_k+Y^{ESE}_{i,k,t-1}\gamma^{ESE}_k+\eta_{ik})}.$$

Conditional on η_{iPE}, η_{iOASE}, and η_{iESE}, the probability of observing an individual's sequence of choices in the sample is:

$$P_i(\eta_{iPE},\eta_{iOASE},\eta_{iESE})=\prod_{t=1}^{T}(P_{i,NE,t})^{Y_{i,NE,t}}(P_{i,PE,t})^{Y_{i,PE,t}}(P_{i,OASE,t})^{Y_{i,OASE,t}}(P_{i,ESE,t})^{Y_{i,ESE,t}} \quad (4)$$

The unconditional probability of observing individual *i*'s sequence of choices is obtained by integrating (4) with respect to the joint probability density function of η_{iPE}, η_{iOASE}, and η_{iESE}:

$$P_i=\int_{\eta_{iPE}}\int_{\eta_{iOASE}}\int_{\eta_{iESE}}P_i(\eta_{iPE},\eta_{iOASE},\eta_{iESE})dF(\eta_{iPE},\eta_{iOASE},\eta_{iESE}), \quad (5)$$

where *F* is the cumulative density function of a multivariate normal distribution. The log-likelihood function for an independent sample of *N* individuals each observed during *T* periods is:

$$\ln L=\sum_{i=1}^{N}\ln P_i. \quad (6)$$

Since Monte Carlo integration is used to evaluate the integral in (5), the model is said to be estimated by means of simulated maximum likelihood.

The remaining complication in estimating the model is the problem of initial conditions. The presence of lagged state variables means that the model is dynamic. The employment outcomes observed in the data depend on unobserved employment outcomes in the past. The paper addresses this problem by following Wooldridge's (2005) suggestion of defining the likelihood of observing the individual's outcomes in *t = 3, 4, ..., T*, conditional on the explanatory variables and the initial condition in *t = 1*.

3 Data

3.1 Description and sample restrictions

The comparison of labour market dynamics in the 1990s and the 2000s is carried out by means of the Survey of Labour and Income Dynamics (SLID). The SLID is a series of overlapping six-year panels. This paper uses the first and last of these six-year panels. The first spans 1993 to 1998, while the last covers 2002 to 2007. The target population for the sample survey includes almost all individuals in Canada; residents of the territories (Northwest Territories, Yukon, and Nunavut), residents of institutions, and persons living on Indian reserves or in military barracks are not included. The panels are representative of the population at the start of each panel. Labour market and demographic information is collected in January for the previous year, and income information comes primarily from administrative sources. In this paper, individuals are

non-employed if they did not have a job at any point in the year, and are paid-employed, own-account self-employed, or employers according to the "class of worker" characteristic of their main job. The main job is determined by the number of hours worked and tenure.

Sample restrictions are made in order to abstract from a few labour market issues. First, attention is restricted to males.[8] Second, as in Kuhn and Schuetze (2001), the analysis is limited to individuals aged 25 to 54 at the beginning of each panel, in order to abstract from the movement of older individuals into self-employment as a way of easing into full retirement. It has been shown that the self-employed are more likely to continue working at older ages, and that the paid-employed are increasingly likely to move into self-employment as they age (see Fuchs 1982). Third, although the model includes the non-employed, some individuals do not have any labour force attachment. These individuals are eliminated from the analysis by dropping all individuals who never had a job in any of the six years during which they were in the survey. Fourth, the amount of labour engaged in agricultural production has declined over time. Since a large fraction of these workers are self-employed farmers, the decline in agricultural labour would translate into increased movement from self-employment to paid employment or to non-employment. In order to eliminate the effect of this trend on the transitions from the analysis, individuals who have worked in agriculture at any time over the six-year period are dropped from the sample. Finally, one of the explanations for the dramatic increase in self-employment in the 1990s was weak labour market conditions. Moore and Mueller (2002) showed that laid-off workers had a higher probability of moving into self-employment over this time period. One sector that continually exhibited declining employment as self-employment rose was public administration. In order to remove the effect of government downsizing on the transitions, individuals who have worked in public administration at any time over the six-year period are not included in the analysis.[9]

3.2 Transition rates

The transition rates for the estimation samples are presented in Table 1. As explained in the previous section, the dynamic nature of the model means that the model is estimated for the 1995–1998 and 2004–2007 periods. For example, since the data for 1993 are used for the initial conditions, the first employment outcomes to be modeled are those for 1995 (this outcome depends on the lagged state in 1994). Table 1 shows the transition rates for all the person-year observations in those two time periods. There are 17,570 person-year observations for the 1990s and 13,754 person-year observations for the 2000s.

8. Female self-employment rates are lower than male self-employment rates. This is particularly the case for self-employment with paid help. Over the 1993–2007 period, the Labour Force Survey shows that the rate of self-employment with paid help for females ranged from 2.8% to 3.2%, while the rate for males was 7.0% to 8.8%. The analysis of transitions exacerbates the problem of a smaller self-employment sample for females; consequently, this paper focuses solely on males. As in the case of males, it can be shown that female self-employment was more persistent in the 2000s than in the 1990s. These tables are available upon request.
9. The conclusions of the paper are not substantially affected by the exclusion of government and agricultural workers. Results including these workers are available upon request.

Table 1
Transition rates

	Average annual rate of transition between adjacent years				Change between 1990s and 2000s	
	1990s		2000s			
	rate	standard error	rate	standard error	rate	t-statistic
Transition from non-employment to						
Non-employment	0.610	0.027	0.552	0.032	-0.058	1.390
Paid employment	0.331	0.027	0.361	0.030	0.030	0.740
Own-account self-employment	0.048	0.011	0.072	0.017	0.024	1.180
Employer	0.010	0.004	0.015	0.006	0.004	0.590
Transition from paid-employment to						
Non-employment	0.024	0.002	0.024	0.002	0.000	0.000
Paid employment	0.948	0.003	0.957	0.003	0.009	2.120
Own-account self-employment	0.019	0.002	0.015	0.002	-0.004	0.004
Employer	0.009	0.001	0.005	0.001	-0.005	2.580
Transition from own-account self-employment to						
Non-employment	0.023	0.008	0.017	0.005	-0.006	0.610
Paid employment	0.157	0.015	0.074	0.010	-0.084	4.670
Own-account self-employment	0.769	0.018	0.898	0.012	0.129	6.140
Employer	0.051	0.051	0.012	0.004	-0.039	4.170
Transition from employer to						
Non-employment	0.005	0.002	0.013	0.004	0.009	1.860
Paid employment	0.101	0.012	0.044	0.008	-0.057	4.010
Own-account self-employment	0.047	0.009	0.018	0.006	-0.029	2.700
Employer	0.847	0.014	0.924	0.011	0.077	4.350

Source: Survey of Labour and Income Dynamics.

The 1990s and 2000s columns of Table 1 show the distribution of individuals over the employment states of non-employment, paid employment, own-account self-employment, and self-employment with paid help, conditional on the individual's previous state. For example, the first row in the first column of Table 1 shows that, of the males who were non-employed in the previous year, 61% remained in non-employment in the following year. Subsequent rows in the same column show what happened to the remainder of the non-employed in the previous year: 33% found work in paid employment; 5% became own-account self-employed; and 1% started a business with employees. There is persistence in all employment states. For example, in the 1990s, 95% of the paid-employed, 77% of the own-account self-employed, and 85% of employers did not change employment states from year to year. Despite the fact that there may be setup costs associated with starting a business, there is less persistence in the self-employment states than in paid employment. This is likely due to higher variability in business income compared to wage income. The argument that hiring employees is a sign of greater commitment to running a business is in line with the finding that there is more persistence in self-employment with paid help than in own-account self-employment.

The fifth column of Table 1 shows how the transitions rates changed between the 1990s and the 2000s. The persistence in all employment states, except non-employment, rose between the two time periods. Persistence increased by only about 1 percentage point in paid employment, but it increased by 13 percentage points in own-account self-employment and by 8 percentage points in self-employment with employees.

Interestingly, not only do the transition rates between paid employment and both types of self-employment fall, but so do the transition rates between the two types of self-employment. One might have expected more transitions from own-account self-employment to self-employment with paid help in the 2000s because fewer individuals were using self-employment as a stopgap. Thus a higher percentage of own-account self-employed might be expected to progress to self-

employment with paid help in the 2000s. The decline in the transition rates between the two types of self-employment may instead indicate that own-account self-employment is becoming more distinct from self-employment with paid help. For example, a computer programmer/consultant who works on projects by himself at home might have no intention of ever hiring paid help.

There is also an increased flow out of non-employment, but such results are not statistically significant. This is probably due to the fact that the number of males that remain in non-employment for the entire year is generally small. The likely explanation for the decrease in persistence in non-employment is straightforward: the improved labour market conditions in the 2000s made it possible for individuals to find work more easily. The reason for the increases in the persistence in the other employment states is less certain and is explored by means of regression results.

A major difference between the 1990s and the 2000s is that the 1990s were a period of transition; own-account self-employment rose sharply. In contrast, own-account self-employment was relatively stable in the 2002–2007 period. The higher transition rates of the 1990s could be due simply to the fact that this study compares a transition period to a period that more closely approximates a steady state. Increasing own-account self-employment driven by higher entry rates into self-employment need not be accompanied by higher exit rates. However, previous evidence shows that younger firms are more likely to fail than older firms.[10] More generally, it might be argued that the increased transition rates in the 1990s may be associated with lower tenure in each employment state. In terms of the estimation model, tenure in the employment state is an omitted variable that may bias the results, especially the estimates of the lagged state variables. The lagged state variables are meant to pick up the effect of an individual's entire past employment history, including the length of time in each employment state. Unfortunately, the six-year panels available in the SLID mean that more lagged states cannot be included and that the length of time in each employment state cannot be determined.[11]

3.3 Summary statistics

Possible explanations for the observed changes in the pattern of labour market transitions include changes in demographics and changes in industrial and occupational structure. Tables 2 and 3 present these summary statistics by employment outcome. Compared to males in the 1990s, males in the 2000s are older, more educated, and more likely to be immigrants.[12] If age, education, and immigration status increase the attractiveness of being own-account self-employed vis-à-vis the other employment states, for example, then this observed trend would mean that the probability of moving to own-account self-employment, conditional on any previous employment outcome, would increase.

10. See, for example, Lin, Picot, and Yates (1999).
11. SLID does ask how long one has been non-employed, but it does not ask how long one has been in self-employment or in paid employment.
12. Only immigrants who arrived in Canada after the age of 18 are considered *immigrants* for purposes of this paper.

Table 2
Summary statistics, males — Not employed and paid employee

	Not employed				Paid employee			
	1990s		2000s		1990s		2000s	
	years	standard error	years	standard error	years	standard error	years	standard error
Mean age	44.3	0.5	47.3	0.5	41.0	0.1	42.9	0.1
	proportion	standard error	proportion	standard error	proportion	standard error	proportion	standard error
Education								
Less than high school	0.310	0.024	0.213	0.022	0.175	0.005	0.114	0.004
High school	0.084	0.015	0.139	0.018	0.129	0.004	0.149	0.005
Some postsecondary	0.108	0.018	0.144	0.020	0.115	0.004	0.104	0.004
Postsecondary certificate	0.382	0.027	0.307	0.027	0.395	0.006	0.390	0.006
Bachelor's	0.048	0.008	0.108	0.019	0.103	0.004	0.131	0.005
Above bachelor's	0.049	0.020	0.061	0.016	0.078	0.004	0.089	0.004
Immigrant	0.105	0.022	0.166	0.025	0.083	0.004	0.112	0.005
Married	0.576	0.028	0.731	0.024	0.771	0.006	0.761	0.006
Children	0.452	0.027	0.514	0.029	0.625	0.007	0.604	0.006
Industry								
Forestry	0.063	0.009	0.048	0.008	0.042	0.002	0.047	0.002
Manufacturing	0.173	0.020	0.244	0.023	0.271	0.006	0.242	0.005
Construction	0.131	0.017	0.118	0.018	0.093	0.004	0.096	0.004
Trade	0.121	0.017	0.110	0.017	0.156	0.005	0.145	0.005
Transportation	0.063	0.017	0.103	0.017	0.092	0.004	0.078	0.004
FIRE	0.038	0.012	0.033	0.011	0.043	0.003	0.057	0.003
Professional	0.015	0.005	0.051	0.016	0.045	0.003	0.069	0.003
Business services	0.104	0.014	0.052	0.014	0.030	0.003	0.037	0.002
Education	0.066	0.014	0.064	0.015	0.075	0.003	0.069	0.004
Health care	0.058	0.015	0.035	0.011	0.035	0.002	0.044	0.002
Information	0.081	0.021	0.049	0.013	0.041	0.003	0.051	0.004
Accommodation and food	0.032	0.011	0.038	0.009	0.031	0.003	0.025	0.002
Other services	0.045	0.008	0.048	0.017	0.041	0.003	0.038	0.002
Occupation								
Management	0.066	0.014	0.097	0.019	0.130	0.005	0.113	0.004
Business	0.058	0.013	0.077	0.015	0.099	0.004	0.102	0.004
Natural sciences	0.037	0.009	0.054	0.015	0.081	0.004	0.126	0.005
Health	0.012	0.008	0.006	0.004	0.015	0.002	0.020	0.002
Social sciences	0.058	0.013	0.044	0.013	0.066	0.003	0.060	0.003
Arts	0.023	0.016	0.019	0.006	0.019	0.002	0.015	0.002
Sales	0.242	0.022	0.187	0.024	0.151	0.005	0.159	0.005
Trades	0.327	0.027	0.308	0.026	0.300	0.006	0.266	0.006
Primary	0.058	0.009	0.047	0.011	0.024	0.001	0.024	0.001
Processing	0.105	0.016	0.142	0.017	0.110	0.004	0.106	0.004
	dollars	standard error	dollars	standard error	dollars	standard error	dollars	standard error
Other family income	21,136	1,445	36,698	2,004	24,951	366	36,453	495

Note: FIRE: finance, insurance and real estate.
Source: Survey of Labour and Income Dynamics.

Table 3
Summary statistics, males — Own-account self-employed and employer

	Own-account self-employed				Employer			
	1990s		2000s		1990s		2000s	
	years	standard error	years	standard error	years	standard error	years	standard error
Mean age	43.7	0.3	44.6	0.3	44.2	0.3	46.1	0.3
	proportion	standard error	proportion	standard error	proportion	standard error	proportion	standard error
Education								
Less than high school	0.237	0.017	0.139	0.013	0.158	0.012	0.098	0.011
High school	0.101	0.010	0.113	0.010	0.167	0.015	0.133	0.014
Some postsecondary	0.129	0.015	0.126	0.012	0.093	0.012	0.111	0.013
Postsecondary certificate	0.362	0.018	0.368	0.018	0.305	0.016	0.331	0.020
Bachelor's	0.100	0.012	0.154	0.014	0.132	0.014	0.160	0.016
Above bachelor's	0.069	0.012	0.082	0.011	0.122	0.014	0.138	0.014
Immigrant	0.103	0.014	0.164	0.015	0.135	0.017	0.122	0.016
Married	0.759	0.017	0.768	0.015	0.877	0.015	0.835	0.017
Children	0.573	0.019	0.613	0.018	0.703	0.018	0.637	0.021
Industry								
Forestry	0.035	0.004	0.033	0.004	0.034	0.004	0.041	0.005
Manufacturing	0.041	0.006	0.049	0.010	0.093	0.012	0.091	0.012
Construction	0.246	0.016	0.192	0.014	0.221	0.016	0.221	0.018
Trade	0.091	0.012	0.112	0.011	0.205	0.016	0.160	0.014
Transportation	0.129	0.013	0.147	0.015	0.065	0.008	0.035	0.007
FIRE	0.090	0.011	0.055	0.007	0.026	0.005	0.047	0.009
Professional	0.126	0.014	0.119	0.012	0.107	0.013	0.134	0.014
Business services	0.047	0.007	0.115	0.001	0.031	0.005	0.074	0.011
Education	0.018	0.005	0.015	0.012	0.004	0.003	0.008	0.003
Health care	0.031	0.007	0.019	0.004	0.073	0.010	0.092	0.013
Information	0.048	0.010	0.071	0.010	0.026	0.005	0.022	0.006
Accommodation and food	0.001	0.000	0.018	0.005	0.068	0.010	0.028	0.007
Other services	0.093	0.011	0.049	0.006	0.045	0.005	0.050	0.010
Occupation								
Management	0.094	0.013	0.134	0.012	0.289	0.018	0.283	0.018
Business	0.068	0.010	0.101	0.011	0.048	0.007	0.080	0.013
Natural sciences	0.064	0.010	0.101	0.012	0.036	0.009	0.027	0.005
Health	0.024	0.007	0.017	0.004	0.075	0.010	0.087	0.013
Social sciences	0.019	0.005	0.007	0.002	0.035	0.006	0.039	0.006
Arts	0.100	0.013	0.088	0.012	0.012	0.003	0.030	0.007
Sales	0.167	0.015	0.095	0.009	0.125	0.013	0.107	0.013
Trades	0.407	0.018	0.331	0.017	0.275	0.016	0.220	0.018
Primary	0.041	0.005	0.060	0.007	0.033	0.004	0.072	0.009
Processing	0.013	0.004	0.037	0.010	0.069	0.011	0.055	0.010
	dollars	standard error	dollars	standard error	dollars	standard error	dollars	standard error
Other family income	27,931	1,855	42,994	2,010	33,526	1,546	49,743	2,181

Note: FIRE: finance, insurance and real estate.
Source: Survey of Labour and Income Dynamics.

Instead, a more localized type of change is needed. For example, assume again that more education increases the attractiveness of being in own-account self-employment more than it does the attractiveness of any other state. If only the workers who were own-account self-employed in the previous period were to become more educated, then only the probability of being in own-account self-employment in period *t+1*, conditional on having been in own-account self-employment in period *t*, would rise. The probability $P(Y_{t+1}^{OASE} = 1 | Y_t^{OASE} = 1)$ would rise, and the other probabilities in the same row, $P(Y_{t+1}^{NE} = 1 | Y_t^{OASE} = 1)$, $P(Y_{t+1}^{WE} = 1 | Y_t^{OASE} = 1)$, and $P(Y_{t+1}^{ESE} = 1 | Y_t^{OASE} = 1)$, would fall. These employment-state-specific changes in the

demographics, however, are not evident. In most cases, the demographic changes are occurring in the same direction.

Tables 2 and 3 also show the distribution of individuals across industries and occupations by employment state.[13] One reason why persistence in paid employment, own-account self-employment, and self-employment with employees may have increased is that paid employees may be increasingly concentrated in some industries, while the own-account and employer self-employed may be increasingly concentrated in others. To the extent that industry- or occupation-specific human capital exists (see Neal 1995 and Kambourov and Manovskii 2009, for example), the differences in industrial/occupational concentration across employment states would mean that the paid-employed and the two-types of self-employed are accumulating human capital that is not easily transferable between employment states. If the differences in the industrial/occupational structure increased, then it would be increasingly difficult for workers to move between employment states. In the extreme, if the paid-employed were found only in certain industries and occupations, own-account self-employed only in others, and employers only in yet others, moving between employment states would be as difficult as moving between industries and occupations.

As well, Tables 2 and 3 show that, for males, the distributions across industries for the paid-employed, the own-account self-employed, and employers are quite different. In the 1990s, roughly one-quarter of paid-employed could be found in manufacturing, compared to 4% for the own-account self-employed and 9% for employers. In contrast, roughly one-quarter of the own-account self-employed could be found in construction, compared to 9% for paid employment and 22% for employers. Employers are also more highly concentrated in trade (21%) than the own-account self-employed (9%) and paid-employed (16%). The differences in the distributions across occupations tell a similar story. The paid-employed are more highly concentrated in processing occupations; own-account self-employed are more concentrated in the trades; and employers are more likely to be managers. One way of measuring how similar the distributions are is to calculate the absolute values of the differences in the distributions between two employment states and then take the sum of those absolute values. The use of this metric indicates that the industry and occupation distributions have generally become more similar. The exception is the difference in the occupation distributions for the wage-employed and employers. Therefore, for males, changes in the industry and occupation distributions likely did not cause the increase in persistence.

The final variable in Tables 2 and 3 is other family income. This is the total income of the family from all sources minus the total income of the individual. The consumer price year (base year 2000) is used to deflate the amounts. It is expected that higher other family income is negatively correlated with work. Other family income is included as an explanatory variable to aid in the identification of the model. Prowse (2007) showed that a statistically significant continuous variable is one of the conditions that need to be fulfilled before it can be said that the identification of the model does not rely solely on the parametric assumption for the error term.

4 Estimation results

4.1 Model estimates

The model estimates for males are presented in Tables 4 and 5. Explanatory variables typically found in earnings regressions and labour force participation equations are included, namely

13. The non-employed are assigned the industry and occupation of their last job. If they were non-employed at the beginning of the panel, they are assigned the industry and occupation of their first job. This is possible because all individuals in the restricted sample had at least one job over the six-year period.

controls for age, education, immigrant status, marital status, the presence of school-age children, other family income, and industry and occupation. Provincial unemployment rates are used to account for changes in the business cycle, and year dummies are used to pick up other unidentified aggregate effects. A set of dummies indicating the employment state of the individual at the beginning of the panel are included in order to address the initial conditions problem.[14]

Table 4
Mixed logit estimated coefficients, males, 1990s

	Paid employee		Own-account self-employed		Employer	
	coefficient	standard error	coefficient	standard error	coefficient	standard error
State in previous year						
Paid employee	3.875	0.275 [1]	2.324	0.364 [1]	3.048	0.487 [1]
Own-account self-employed	2.689	0.555 [1]	5.278	0.554 [1]	4.246	0.656 [1]
Employer	3.534	0.423 [1]	4.164	0.519 [1]	8.032	0.547 [1]
Aged 25 to 34	0.497	0.204 [1]	0.274	0.244	0.416	0.317
Aged 45 to 54	-0.472	0.168 [1]	-0.290	0.192	-0.514	0.224 [1]
Education						
Less than high school	-0.414	0.219 [1]	-0.421	0.282	-0.779	0.319 [1]
Some postsecondary	-0.069	0.253	-0.189	0.326	-0.348	0.418
Postsecondary certificate	-0.171	0.219	-0.248	0.262	-0.277	0.306
Bachelor's	0.355	0.313	-0.186	0.380	0.239	0.443
Above bachelor's	0.163	0.592	-0.092	0.572	-0.069	0.632
Immigrant	0.018	0.281	0.566	0.350 [1]	0.511	0.371
Married	0.561	0.221 [1]	0.536	0.255 [1]	0.873	0.337 [1]
Children	0.283	0.211	0.179	0.226	0.474	0.289 [1]
Other family income	0.000	0.003	0.004	0.005	0.001	0.004
Unemployment rate	-0.068	0.022 [1]	-0.081	0.029 [1]	-0.055	0.034 [1]
Initial conditions						
Paid employee	0.533	0.305 [1]	0.196	0.295	0.044	0.453
Own-account self-employed	-0.676	0.593	1.164	0.501 [1]	0.608	0.626
Employer	0.127	0.485	0.961	0.481 [1]	1.770	0.561 [1]

1. Statistical significance at the 10% level.
Note: Industry, occupation, and time dummies are included in both regressions.

14. In past studies, means of the explanatory variables are sometimes also included in order to control for initial conditions, but there is so little time variation in the short panel that collinearity problems arose when these variables were added.

Table 5
Mixed logit estimated coefficients, males, 2000s

	Paid employee		Own-account self-employed		Employer	
	coefficient	standard error	coefficient	standard error	coefficient	standard error
State in previous year						
Paid employee	3.700	0.235 [1]	1.152	0.423 [1,2]	1.669	0.582 [1,2]
Own-account self-employed	1.714	0.429 [1]	4.954	0.663 [1]	2.251	0.783 [1,2]
Employer	1.727	0.590 [1,2]	2.108	0.867 [1,2]	7.052	0.878 [1]
Aged 25 to 34	0.466	0.247 [1]	0.988	0.362 [1,2]	0.539	0.552
Aged 45 to 54	-0.498	0.161 [1]	-0.552	0.224 [1]	-0.500	0.296 [1]
Education						
Less than high school	-0.504	0.238 [1]	-0.656	0.372 [1]	-0.884	0.522 [1]
Some postsecondary	-0.206	0.251	-0.243	0.381	-1.044	0.464 [1]
Postsecondary certificate	-0.008	0.219	0.080	0.318	-0.230	0.374
Bachelor's	-0.249	0.284	0.024	0.413	-0.251	0.677
Above bachelor's	0.104	0.339	0.134	0.496	0.285	0.543
Immigrant	-0.544	0.230 [1]	0.059	0.329	-0.665	0.486 [2]
Married	0.166	0.173	0.008	0.304	-0.234	0.353 [2]
Children	0.258	0.140 [1]	0.218	0.238	0.542	0.300 [1]
Other family income	-0.005	0.003 [1]	0.003	0.003	-0.002	0.003
Unemployment rate	-0.021	0.029	-0.052	0.044	-0.091	0.061
Initial conditions						
Paid employee	1.013	0.229 [1]	0.419	0.303	0.206	0.519
Own-account self-employed	0.616	0.530 [2]	2.436	0.615 [1]	1.741	0.786 [1]
Employer	0.040	0.512	0.004	0.590	1.145	0.666 [1]

1. Statistical significance at the 10% level.
2. Change between 1990s and 2000s is statistically significant at the 10% level.
Note: Industry, occupation and time dummies are included in both regressions.

Focusing first on the 1990s, Table 4 shows that the coefficients on each of the lagged employment state dummies are positive and statistically significant. This means that any form of previous work for compensation raises the attractiveness of being paid-employed, own-account self-employed, or an employer in the current period relative to the returns associated with being non-employed. The effect of having been paid-employed, own-account self-employed, and an employer in the last period has the greatest impact on the attractiveness of paid employment, own-account self-employment, and self-employment with paid help, respectively. For example, having been paid-employed last period raises the attractiveness of being paid-employed in the current period (net of the attractiveness of being non-employed) by 3.875. Having been paid-employed in the last period has less of an effect on the attractiveness of being own-account self-employed (2.324) and an employer (3.048) in the current period. When one interprets the lagged employment state variables as picking up human capital accumulation, the results show that, while skills are transferable, there is some degree of specificity.

A comparison of the 1990s with the 2000s (Tables 4 and 5) reveals that the coefficients on the lagged employment state variables have generally fallen. However, the coefficients that give the cross-sector effects have declined more in percentage terms than have the coefficients representing the own-sector effects. The impact of having been in paid employment last period on the attractiveness of paid employment in the current period fell from 3.875 in the 1990s to 3.700 in the 2000s, a decline of 4.5%. In contrast, the effect of having been in paid employment last period on the attractiveness of own-account self-employment in the current period fell by 50% (from 2.324 in the 1990s to 1.152 in the 2000s), and the effect of having been in paid

employment last period on the attractiveness of being an employer in the current period fell by 42% (from 3.048 to 1.669). The declines in the other own-sector effects are also small in comparison with the other cross-sector effects. Being in own-account self-employment last period increased the attractiveness of own-account self-employment in the current period by 5.278 in the 1990s and 4.954 in the 2000s, a 6.1% decline. This is a much smaller decline than the 36% (from 2.689 in the 1990s to 1.714 in the 2000s) decline in the effect of lagged own-account self-employment on the attractiveness of paid employment and the 47% (from 4.246 in the 1990s to 2.251 in the 2000s) decline in the effect of lagged own-account self-employment on the attractiveness of being an employer. Similarly, the 12% decline (from 8.032 in the 1990s to 7.052 in the 2000s) in the lagged effect of having been an employer in the past on the attractiveness of being an employer in the current period is smaller than the effect on the attractiveness of being in paid employment and in own-account self-employment, at 51% and 49%, respectively. Again, in the context of human capital accumulation, this suggests that skills have become less transferable across employment states.

The superscript number 2 (^{2}) in Table 5 denotes the coefficients in the 2000s that are statistically different from their counterparts in the 1990s.[15] Many of the changes in the lagged state variables are statistically significant. Aside from the coefficients on the lagged state variables, few other coefficients have changed over time.

Further analysis of the coefficients from the model is omitted, as the sign and size of the coefficients themselves do not give all the information necessary in order to predict the sign and size of the effect of the explanatory variables on the probability of being in one employment state or another.[16]

The average marginal effects from the model are presented in Tables 6 and 7. The cell in the first row shows the average marginal effect of having moved from non-employment to paid employment in the previous period on the probability of being non-employed in the current period.

$$\frac{1}{NT}\sum_t\sum_i\left(\begin{array}{l}P(Y_{i,t+1}^{NE}=1\,|\,Y_{it}^{WE}=1,Y_{it}^{OASE}=0,Y_{it}^{ESE}=0,X_{it})-\\P(Y_{i,t+1}^{NE}=1\,|\,Y_{it}^{WE}=0,Y_{it}^{OASE}=0,Y_{it}^{ESE}=0,X_{it})\end{array}\right), \qquad (7)$$

In the 1990s (Table 6), having moved from non-employment to any other employment state in the previous period lowers the probability of being in non-employment in the current period substantially, by over 40 percentage points. The effect of having moved to paid employment in the previous period raises the probability of being in paid employment in the current period by 44 percentage points and lowers the probability of being in own-account self-employment and in self-employment with paid help in the current period as well. These negative effects, however, are not statistically significant. The results are similar for moving to the two forms of self-employment in the previous period.[17] State dependence raises the probability of remaining in the

15. What is reported in Tables 4 to 7 are the results of a t-test; the difference in the coefficients between two time periods, divided by the square root of the sum of their variances.
16. The unemployment rate is also among the variables that are statistically significant. Higher unemployment lowers the returns to all employment states—paid employment, own-account self-employment, and self-employment with paid help—relative to non-employment. Poorer economic conditions make a move into non-employment more likely to increase the probability of staying longer in non-employment. Another interesting difference between the 1990s and the 2000s is that the unemployment rate is no longer statistically significant in the 2000s. This could be because there is less variation in the unemployment rate in the 2000s, or it could be that the effect of the unemployment rate depends on the nature of the unemployment. For example, Moore and Mueller (2002) suggest that the length of joblessness and the type of separations occurring are important factors.
17. Compared to the marginal effects of the lagged employment state variables, the other marginal effects are small, but as expected. Relative to having a high-school education, having a less than a high-school education increases the probability of being non-employed. Moving from a high-school education to a university degree raises the probability of being in paid employment; being an immigrant lowers the probability of paid employment and raises

same sector, but it has little or no effect on the probability of moving to other sectors, save non-employment. These average marginal effects reflect the coefficient estimates presented in the previous table. For example, since having been in paid employment last period raises the returns to being in paid employment in the current period more than it raises the returns to being in any other employment state, it is not surprising that the marginal effect of moving from non-employment to paid employment in the last period raises the probability of being in paid employment in the current period the most.

Table 6
Average marginal effects, males, 1990s

	Probability of being in current state							
	Not employed		Paid employee		Own-account self-employed		Employer	
	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error
Past year state from not employed to								
Paid employee	-0,414	0,073 [1]	0,443	0,070 [1]	-0,029	0,021	0,000	0,010
Own-account self-employed	-0,407	0,075 [1]	-0,042	0,085	0,416	0,054 [1]	0,034	0,013 [1]
Employer	-0,427	0,074 [1]	-0,117	0,074	-0,003	0,023	0,546	0,040 [1]
Aged 35 to 44 to aged 25 to 34	-0,011	0,005 [1]	0,016	0,008 [1]	-0,006	0,006	0,000	0,006
Aged 35 to 44 to aged 45 to 54	0,013	0,006 [1]	-0,016	0,008 [1]	0,005	0,005	-0,003	0,004
High school to								
Less than high school	0,012	0,006 [1]	-0,005	0,009	0,001	0,008	-0,009	0,006
Some postsecondary	0,002	0,006	0,006	0,011	-0,002	0,009	-0,006	0,008
Postsecondary certificate	0,005	0,006	-0,004	0,009	-0,002	0,016	-0,002	0,002
Bachelor's	-0,007	0,007	0,021	0,013 [1]	-0,016	0,011	0,002	0,009
Above bachelor's	-0,003	0,015	0,013	0,019	-0,006	0,015	-0,003	0,007
Non-immigrant to immigrant	-0,002	0,008	-0,021	0,011 [1]	0,016	0,009 [1]	0,007	0,007
Not married to married	-0,017	0,008	0,010	0,010 [1]	-0,002	0,006 [1]	0,008	0,007
No children to having children	-0,008	0,006	0,006	0,009	-0,004	0,005	0,006	0,005
Other family income	0,000	0,002	-0,003	0,005	0,004	0,004	0,000	0,002
Unemployment rate	0,017	0,005 [1]	-0,013	0,005 [1]	-0,008	-0,009	0,004	0,007
Initial condition change from non-employed to								
Paid employee	-0,015	0,009 [1]	0,038	0,019 [1]	-0,009	0,011	-0,013	0,013
Own-account self-employed	0,015	0,029	-0,140	0,043 [1]	0,098	0,023 [1]	0,027	0,016 [1]
Employer	-0,010	0,018	-0,075	0,031 [1]	0,025	0,017	0,060	0,018 [1]

1. Statistical significance at the 10% level.
Note: Standard errors are calculated by parametric bootstrap with 250 replications.

Turning to the 2000s (Table 7), one can see that the effect of the lagged employment state variables has become larger. The effect of having moved from non-employment to self-employment with paid help in the last period on the probability of being an employer in the current period rises from 55 percentage points to 71 percentage points. Likewise, the effect of moving from non-employment to own-account self-employment in the previous period on the probability of being own-account self-employed in the current period rises 10 percentage points. Whereas the cross-sector effects were statistically insignificant in the 1990s, they are negative and significant in the 2000s. Having moved from non-employment to self-employment with paid help in the previous period lowers the probability of being paid-employed in the current period by 28 percentage points, and having moved from non-employment to own-account self-employment in the previous period lowers the probability of being paid-employed in the current period by 17

the probability of own-account self-employment; and being in manufacturing relative to trade lowers the probability of being self-employed and raises the probability of being in paid employment.

percentage points. Moreover, having been paid-employed last period lowers the probability of being own-account self-employed in the current period by 7 percentage points in the 2000s.

Table 7
Average marginal effects, males, 2000s

	Probability of being in current state							
	Not employed		Paid employee		Own-account self-employed		Employer	
	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error	marginal effect	standard error
Past year state from not employed to								
Paid employee	-0,369	0,053 [1]	0,450	0,055 [1]	-0,069	0,032 [1]	-0,013	0,016
Own-account self-employed	-0,344	0,056 [1]	-0,168	0,059 [1]	0,519	0,070 [1]	-0,007	0,019 [2]
Employer	-0,364	0,059 [1]	-0,279	0,061 [1,2]	-0,063	0,037 [1]	0,706	0,049 [1,2]
Aged 35 to 44 to aged 25 to 34	-0,011	0,005 [1]	-0,002	0,010	0,012	0,008 [1,2]	0,000	0,006
Aged 35 to 44 to aged 45 to 54	0,014	0,004 [1]	-0,011	0,006 [1]	-0,002	0,004	0,000	0,001
High school to								
Less than high school	0,016	0,007 [1]	-0,008	0,010	-0,004	0,007	-0,004	0,005
Some postsecondary	0,007	0,007	0,001	0,010	0,000	0,008	-0,008	0,005 [1]
Postsecondary certificate	0,002	0,006	0,000	0,010	0,002	0,005	-0,002	0,004
Bachelor's	0,006	0,008	-0,010	0,014 [2]	0,005	0,011	-0,001	0,008
Above bachelor's	-0,003	0,008	0,000	0,016	0,000	0,016	0,002	0,006
Non-immigrant to immigrant	0,015	0,008 [1]	-0,023	0,010 [1]	0,012	0,006 [1]	-0,003	0,005
Not married to married	-0,004	0,005	0,009	0,007	-0,002	0,007	-0,003	0,004
No children to having children	-0,007	0,004 [1]	0,005	0,006	-0,001	0,005	0,003	0,003
Other family income	0,003	0,002	-0,008	0,002 [1]	0,005	0,002 [1]	0,000	0,001
Unemployment rate	0,005	0,005 [2]	0,004	0,010	-0,004	0,007	-0,005	0,006
Initial condition change from non-employed to								
Paid employee	-0,034	0,010 [1]	0,053	0,013	-0,011	0,009	-0,008	0,008
Own-account self-employed	-0,035	0,021 [1]	-0,055	0,030 [1,2]	0,078	0,029 [1]	0,013	0,016
Employer	-0,004	0,019	-0,011	0,028	-0,005	0,027	0,020	0,015 [2]

1. Statistical significance at the 10% level.
2. Change between 1990s and 2000s is statistically significant at the 10% level.
Note: Standard errors are calculated by parametric bootstrap with 250 replications.

Both the coefficient estimates and the estimates of the average marginal effects suggest that the change in the effect of an individual's employment state in the previous period plays a role in the change in the transition probabilities. This is confirmed in the experiments discussed in the following section.

4.2 Predicted changes in transition rates

Once the model in the 1990s and the 2000s has been estimated, it is possible to conduct experiments in order to determine which factors are important in terms of explaining the changes in the labour market dynamics. The non-linear nature of the model makes a perfect decomposition unfeasible; however, by changing one element of the 1990s model at a time to that found in 2000s model, one can get a sense of which factors are key.

In the first experiment, the predicted changes in the transitions rates, when only the coefficients on the lagged employment states are allowed to change from their values in the 1990s to their values in the 2000s, are calculated. The results of this experiment can be viewed in the first column of Table 8. Since there is no coefficient for having been non-employed last period, the probabilities conditional on non-employment in the previous period are unaffected. The effects of the changes in the coefficients on the lagged employment states on the other transition rates are significant. A large fraction of the changes in the remainder of the transition matrix are accounted

for. For example, the predicted increases in persistence in paid employment, own-account self-employment, and self-employment with paid help are 1.3 percentage points, 8.5 percentage points, and 6.8 percentage points, respectively. These figures can be compared to the actual changes of 0.9 percentage points, 12.9 percentage points, and 7.7 percentage points, respectively.

Table 8
Predicted changes in transition rates, males

	Change in coefficients		Change in covariates
	On lagged states	Lagged states excepted	
		rate	
Transition from non-employment to			
Non-employment	0.000	-0.061	-0.075
Paid employment	0.000	0.037	0.066
Own-account self-employment	0.000	0.021	0.007
Employer	0.000	0.003	0.003
Transition from paid employment to			
Non-employment	0.004	-0.003	-0.002
Paid employment	0.013	-0.004	-0.001
Own-account self-employment	-0.011	0.005	0.003
Employer	-0.006	0.002	0.000
Transition from own-account self-employment to			
Non-employment	0.012	-0.005	-0.001
Paid employment	-0.057	0.008	0.002
Own-account self-employment	0.085	-0.012	0.003
Employer	-0.039	0.008	-0.004
Transition from employer to			
Non-employment	0.009	0.001	-0.001
Paid employment	-0.048	0.013	-0.010
Own-account self-employment	-0.028	0.001	0.000
Employer	0.068	-0.015	0.011

Source: Authors' calculations.

The second experiment allows the remaining coefficients to change, holding everything else constant at 1990 values (including the coefficients on the lagged employment states). The second column of Table 8 shows that changes in the other coefficients have a minimal impact on the probabilities, conditional on being paid-employed, own-account self-employed, and self-employed with paid help. The effect of changes in the other coefficient does, however, account for all of the changes in the transition rates conditional on being non-employed. This makes sense, as better labour market conditions in the 2000s raised the returns to all types of work relative to non-employment.

The final experiment, shown in the third column of Table 8, calculates the predicted probabilities when the estimated coefficients in the 1990s are applied to individuals in the 2002–2007 panel.[18] These are then compared to the predicted probabilities from the 1990s. As predicted in Section 3.3, the effects of changes in demographics and changes in industrial and occupational structure are small.

18. Experiments where smaller groups of coefficients and characteristics are allowed to change in turn do not yield more insight into the differences between the 1990s and the 2000s.

5 Concluding remarks

This paper compares the self-employment dynamics for males in Canada in the 1990s and the 2000s. It is found that there was less movement between paid employment, own-account self-employment, and self-employment with paid help in the 2000s compared to the 1990s. The more transitory nature of self-employment in the tougher labour market conditions of the 1990s suggests that many individuals were using self-employment as a stopgap, and may not have been fully prepared to start a business. This lower commitment to, or reduced preparedness for, self-employment in the 1990s is likely related to the poorer productivity performance of the unincorporated self-employment sector in the 1990s compared to the 2000s. Previous literature suggests that, on average, entrants are not as productive as incumbents and that it takes time for the productivity of entrants to improve. The fact that there were more newly self-employed in the 1990s and that their businesses did not survive as long as those of their counterparts in the 2000s would have a negative impact on productivity in the self-employment sector. Although this paper draws a distinction between the self-employed with employees and the self-employed without employees, not between the unincorporated self-employed and the incorporated self-employed, the vast majority of the newly self-employed are unincorporated.[19] The individuals who had just transited into self-employment in the 1990s likely had lower attachment to their own businesses and a lower commitment to running a business.

Estimates from a dynamic mixed multinomial logit model suggest that increased state dependence accounts for the increased persistence in paid employment, own-account self-employment, and self-employment with paid workers. Demographic change and changes in the industrial and occupational structure had little effect, while changes in the returns to worker characteristics and improving economic conditions (picked up by the decline in unemployment rates) accounted for the increased flow out of non-employment.

One possible explanation for this increased state dependence could be that greater specialization has made skills learned in one employment state less transferable to another. Another possible explanation is greater costs of moving, such as job search costs and information costs. This latter explanation, however, is improbable given that improvements in information and communications technology should have lowered such costs. Another possibility is that the extensive use of self-employment as an alternative to non-employment in the 1990s made recruiters increasingly wary of reported experience in self-employment. Yet another possibility is that the increased state dependence is picking up the effect of missing variables, such as the length of time one expects to be not-employed and the length of time one has already spent in a particular employment state. Some would argue that the greater entry into self-employment in the 1990s led to a greater number of young businesses, and that this resulted in higher self-employment exit rates since young businesses are more likely to fail than older ones.

Future research could involve a more in-depth investigation of the reasons behind the increase in state dependence. One approach could be to interact the lagged employment state variables with the other explanatory variables. Perhaps older individuals are less likely to make switches in employment state, and the aging of the labour may explain the greater state dependence. Another approach could be to use a longer panel, such as the Longitudinal Worker File, to examine the effect of time spent in each employment state. Another area of possible research is a comparison between Canada and the United States. This might shed light on the differences in the productivity performance of the self-employment sectors of the two countries.

19. Data from the Labour Force Survey show that, between 2000 and 2007, 84% of the self-employed with less than one month's tenure were unincorporated. Over the same period, 61.6% of all self-employed were unincorporated.

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